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ABSTRACT

Parallels between dream states and schizophrenia suggest that the study of dreams may offer some information about schizophrenia. A major theoretical assumption of the research on dreaming and schizophrenia is that, in schizophrenics, the dream state intrudes on the awake state creating a dreamlike symptomatology. This theory, called the REM (rapid eye movement) Phasic-Event-Intrusion Hypothesis (RPEIH), postulates that dream state intrusion results from physiological malfunctions or deficits in the schizophrenic's brain. Research on dreaming and schizophrenia published within the last 20 years, including 26 empirical studies, 2 literature reviews, and 1 theoretical paper were reviewed and analyzed in relation to the RPEIH. It was hypothesized that studies which showed that the boundary between awake and dream consciousness was less distinct in schizophrenics than in other populations would lend support to the RPEIH. The studies were divided into three categories: (1) REM deprivation effects in schizophrenics; (2) differential dream content in schizophrenics; and (3) REM physiological abnormalities in schizophrenics. The review concluded that there is some empirical support for the RPEIH in each of these three categories, although many questions remain to be answered. (NB)

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DREAMING AND SCHIZOPHRENIA

A Doctoral Research Paper

Presented to

the Faculty of the Rosemead School of Psychology

Biola University

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Psychology

by

Jeffrey L. Stickney

May 1987

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DREAMING AND SCHIZOPHRENIA

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ABSTRACT

DREAMING AND SCHIZOPHRENIA

Jeffrey L. Stickney

The purpose of this paper was to review the research exploring the relationship of dreaming to schizophrenia. Only research published in the last twenty years was reviewed, and this body of research included 26 empirical studies, two literature reviews, and one theoretical paper. The research was discussed and analyzed in relation to the REM Phasic-Event-Intrusion Hypothesis (RPEIH), it was hypothesized that studies which showed that the boundary between awake and dream consciousness was less distinct in schizophrenics than in other populations would lend support to the RPEIH. The studies were segregated and reviewed in three broad categories: REM deprivation effects in schizophrenics, differential dream content in schizophrenics, and REM physiological abnormalities in schizophrenics. The review concluded that there is some empirical support for the RPEIH in each of the reviewed categories, but many questions remain to be answered. Implications for future research and clinical application are discussed.

DREAMING AND SCHIZOPHRENIA

There are striking parallels between dream states and psychosis, particularly schizophrenia, and it has been postulated by researchers that studying dreams would offer information about schizophrenia. In both dreams and schizophrenia, individuals manifest hallucinations, bizarre thoughts and thought distortions, poor reality testing, and loss of volitional control (Vogel, 1974). Recognizing these similarities, Hughlings Jackson noted "find out about dreams and you will find out about insanity" (Jones, 1948, p. 269). Because of the similarities between dreams and schizophrenia, it has been suggested that "similar brain mechanisms may occur in both" (Vogel, 1974, p. 63). Indeed, it has been theorized that schizophrenia is a manifestation of the dream state intruding on awake time (Vogel, 1974). When Aserinsky and Kleitman (1955) demonstrated that Rapid Eye Movement (REM) sleep was a reliable physiological correlate of dreaming, empirical testing of the hypothesis of a dream state-schizophrenia link became possible.

The cyclical, frequent, and regular occurrence of REM sleep suggests that it plays an important, but to date unknown, role in the maintenance of well-being (Vogel, 1974). Since the pioneer work of Aserinsky and Kleitman (1955), considerable research has attempted to explore

REM sleep (dreaming) and its connection, if any, to schizophrenia. Confirmation of mechanism similarity between REM sleep and schizophrenia could have profound diagnostic, etiological, and treatment implications for schizophrenia and possibly other mental disorders. Identification of such a mechanism could offer an explanation of the cause(s) of schizophrenia, a physiological means by which to diagnostically differentiate schizophrenia from other mental disorders, and potential treatment interventions for schizophrenia.

In light of the extent of the research on the relationship of REM sleep to schizophrenia and its potential diagnostic and treatment implications, a review of the relevant literature is needed to assess the findings. Previous reviews by Vogel (1974) and Zarcone (1979) have discussed the literature but do not agree as to the findings. In his review, Vogel (1974) concluded that research had failed to find a link between REM sleep and schizophrenia, and he indicated that this likely represents a "refutation of a relation between the two variables." In contrast, Zarcone (1979) is much more optimistic, concluding that the research suggests that there may be some significant links between REM sleep and schizophrenia and that further research is needed to explore these links.

Dream researchers have attempted to assess the relationship of schizophrenia and dreaming by several avenues of investigation. Conceptually, if dreaming and

schizophrenia access overlapping mechanisms, then this overlap should manifest itself in several ways. In general it is theorized that, if dreaming and schizophrenia are related, then schizophrenics should exhibit abnormalities in their dream states, functionally and physiologically. Further, it is theorized that the manifestations of dreams (and psychosis) serve a psychological purpose; if this is the case, then manipulation of the dream state should result in psychological disequilibrium which may manifest itself differentially in schizophrenics.

A major theoretical assumption of the research on dreaming and schizophrenia is that, in schizophrenics, the dream state intrudes on the awake state creating a dreamlike symptomatology. This theory, called the REM Phasic-Event-Intrusion Hypothesis (RPEIH), postulates that dream-state intrusion results from physiological malfunctions or deficits in the schizophrenic's brain. Animal research has lent some analogue support to this theory. Specifically, cats which have been given a serotonin synthesis inhibitor, parachlorophenylalanine (PCPA), exhibit schizophrenic-like symptoms: hallucinations, abnormal EEG and REM patterns, and an alleviation of symptoms by treatment with chlorpromazine (an antipsychotic medication). The RPEIH then, if supported by the research on dreaming and schizophrenia, could explain the link between dreaming and schizophrenia while offering an etiological explanation of schizophrenia and suggesting treatment approaches.

Given the controversy surrounding the research and the need to assess more recent developments, this paper will review the literature on REM sleep and schizophrenia from 1966 to 1986. The review will be confined to this time frame because earlier research tended to be weak methodologically and has been previously reviewed by Vogel (1974) and Zarcone (1979). Only empirical studies in English will be reviewed. Because of the potential utility of the RPEIH, the extent of the empirical support for the RPEIH viz-à-viz the literature reviewed will be assessed.

Theoretical Overview

Because of the complex and technical nature of REM sleep research (particularly as it pertains to schizophrenia), a brief overview of the theoretical antecedents and consequent questions pertaining to the research will be presented. This overview will be supplemented by a brief theoretical introduction in each subsection to orient the reader to the foci of that subsection's research.

As previously indicated, the general purpose of the research on REM sleep and schizophrenia has been to assess the extent, if any, of relationship between schizophrenia and REM sleep (dream) variation. The relationship of REM sleep to schizophrenia has been studied along three basic avenues of investigation: (a) the effects of REM

deprivation on schizophrenia, (b) a comparison of schizophrenic dream content to that of nonschizophrenics, and (c) the evaluation of physiological deviations in schizophrenic REM sleep behavior. Each of these three avenues will be briefly discussed in turn.

Researchers investigating the effects of REM deprivation on schizophrenics have focused on two conceptual issues. First, if REM sleep is necessary for psychological well-being, as is suggested by its cyclical nature, then REM deprivation should result in an increase in psychotic symptomatology in schizophrenics. It could be argued that such a result would suggest that REM needs are being compensated for by REM intrusion on waking behavior (psychotic symptoms), supporting the RPEIH. A second issue concerns the psychological reaction of schizophrenics once REM deprivation has been discontinued. In normal individuals, cessation of REM deprivation will be followed by several nights in which REM sleep is significantly increased, as if the denied dream time is being restituted. This is called a REM rebound effect, and represents a measurable, significant increase of REM activity over the individual's established baseline (pre-deprivation) of REM sleep to total sleep ratio. Either significant exaggeration or significant reduction in schizophrenic rebound effects could lend support to the RPEIH. This will be discussed in greater detail in the relevant subsection.

Researchers investigating the dream content of schizophrenics have explored the issue along two related hypotheses. First, it has been hypothesized that schizophrenic dream content can be consistently differentiated from the dream content of nonschizophrenics and hence may offer a diagnostic tool. Second, it has been hypothesized that schizophrenic dream content should have recurring themes and should reflect the underlying psychopathology of the schizophrenic. Should schizophrenic dream content be shown to resemble the manifestations of schizophrenic waking thought and behavior, then it can be argued that this is consistent with a theory of dream state intrusion (the RPEIH) on the waking state of schizophrenics.

Finally, researchers investigating physiological abnormalities in schizophrenics during REM are concerned with two conceptual issues. First, if the dream state is dysfunctional in schizophrenics, then schizophrenics should evidence some abnormalities in REM function and its physiological correlates. Second, significant leakage of physiological behavior normally limited to REM sleep into non-REM sleep or waking would lend support to the RPEIH.

These theoretical questions and the relevant research will be organized and reviewed in three subsections, corresponding to the theoretical foci of each of the three major avenues of investigation. First the differential effects of REM deprivation on schizophrenia will be reviewed, then the extent of differential content in

schizophrenic dreams will be assessed, and finally the physiological differences of schizophrenics in the dream state will be reviewed.

Studies on REM Deprivation and Schizophrenia

Based on the assumption that dreaming, or REM sleep, is important for psychological well-being, it has been theorized that REM sleep deprivation would result in psychological imbalance or increased psychopathology. Hence, a forced reduction of REM sleep should have pathological consequences. More specifically, as postulated by the RPEIH, if schizophrenia implicates dream mechanisms intruding on waking life, than denial of sleep dream time should enhance this intrusive effect. Such an increase in intrusion would manifest itself as psychopathological symptoms. In his review of the literature, Vogel (1974) noted that early research appeared to support this claim. However, Vogel (1974) discounts these findings as being derived from poorly controlled methodology.

Several studies have sought to shed more light on this issue. One study that attempted to assess the psychological effects of dream deprivation is Zarcone, Zukowsky, Gulevich, Dement, and Hoddes (1974), who REM deprived 4 male schizophrenics and 5 male nonpsychotics. All subjects were inpatients at a psychiatric hospital. Following the establishment of a 3 to 11 night REM baseline, subjects were

REM deprived for 2 consecutive nights by being awakened at the start of each REM period. Each subject was administered the Rorschach by one of the authors according to an odd-even split, involving presentation of half the cards prior to deprivation and half of the cards following deprivation. The cards were scored utilizing Holt's scoring scheme, which is designed to measure primary process manifestations. The authors found that, while there was no significant difference between groups prior to deprivation, after deprivation the schizophrenics had significantly higher scores in maladaptive regression and blatant expression of primary process responses. The authors note that the Rorschach responses were not analyzed by independent judges; this could confound knowledge with diagnostic groups. In addition, the small subject pool weakens the generalizability of the results.

In a somewhat different type of study, Snyder, Anderson, Bunney, Jr., Kupfer, Scott, and Wyatt (1968) took sleep recordings from 4 depressive and 3 acute schizophrenic patients in a longitudinal study spanning from 36 to 100 nights. There was no attempt to induce REM deprivation during the observational period. The authors found that exacerbations of symptoms coincided with significant reductions in REM sleep in both groups. However, the authors stated that these results did not form a consistent pattern, and they therefore concluded that the schizophrenics did not evidence naturally occurring REM

deprivation or compensation. The authors offered no further discussion to reconcile the apparent conflict between their findings and their conclusions.

In a study more explicitly contradicting the results of Zarcone et al (1974), Vogel and Traub (1968) REM deprived 4 male and one female hospitalized chronic schizophrenics. Following the establishment of a 2 to 3 night baseline, subjects were REM deprived for 7 consecutive nights. Four subjects were REM deprived by the use of dexedrine (an amphetamine which decreases REM time) and hand awakenings, and the fifth subject was REM deprived by hand awakenings only. In addition, 4 of the 5 subjects were on phenothiazines. The 7 REM deprivation nights were followed by 5 postdeprivation nights of uninterrupted sleep. During the 15-day experimental period, each subject was administered a psychological test battery during the baseline, deprivation, and postdeprivation periods. The researchers noted that the test battery was administered "frequently," without otherwise indicating how often this meant. Four subjects were measured by a standardized interview (the Inpatient Multidimensional Psychiatric Scale), two behavioral scales (the Psychotic Reaction Profile and the Hospital Adjustment Scale), the Bender Visual Motor Gestalt Test, and the Rorschach Ink Blot Test. The fifth subject was "accidentally" measured with instruments from another study, which ". . . included the PRP, Current Behavior Checklist, Zung's Self-Rating

Depression Questionnaire, and continuous behavioral observation by the ward staff" (Vogel & Traub, 1968, p. 290). The authors found that the mean REM percent for the subjects on the first postdeprivation night was significantly higher than the mean REM percent for the baseline nights. Further, the authors found no intensification of pathological symptoms as a function of REM deprivation. The authors compared their data post hoc with normative data on non-schizophrenics in other studies and found no significant variations. Based on these findings, the authors concluded that their study offered no evidence to indicate that REM deprivation exacerbates psychotic symptomatology or that schizophrenic REM behavior is significantly different from the REM behavior of normals. This study is weakened by its lack of a control group. In addition, its use of amphetamines to deprive REM sleep decreases the comparability of its results with studies which did not use this technique. The generalizability of this study's results is limited by its small subject pool. Notably, the authors' use of the terms "frequently" and "accidentally" when describing methodological procedures raises concerns as to the adequacy of their controls.

De Barros-Ferreira, Goldsteinas, and Lairy (1973) made all-night sleep recordings of 5 normal subjects and 11 chronic schizophrenics with active symptomatology for 9 consecutive nights: 3 baseline nights, 3 REM deprivation nights, and 3 recovery (rebound) nights. The authors stated

that they considered comparison between the schizophrenics and the normals invalid because the normals were studied under different conditions than were the schizophrenics; the authors did note that their normals' data was comparable to the normals' data in other studies. The authors found that REM deprivation had no disruptive effect but did not elaborate as to how these effects were assessed; in fact, 3 of the 11 schizophrenics clinically improved. No indication was given as to how disruption or improvement was assessed. The authors did note that this improvement could be a function of increased nursing care. The 3 patients which improved were also the most ill, and hence their improvement could represent a regression towards the mean. Notably, this study did not score or analyze the sleep records according to standard criteria (Gillin, Buchsbaum, Jacobs, Fram, Williams, Jr., Vaughan, Jr., Mellon, Snyder, & Wyatt, 1974).

It is both surprising and unfortunate that only 4 additional studies have been generated in the past 20 years to directly examine the effects of REM deprivation on schizophrenics. Two of the studies are limited in their generalizability by their small subject pool. Vogel and Traub's (1968) study is further weakened by its lack of a control group and the use of amphetamines to facilitate REM deprivation; the amphetamines could offer a confounding variable interfering with the effects of REM deprivation. Regardless, the conflicting conclusions of these studies can

neither confirm nor deny the hypothesis that REM deprivation increases pathology. It appears, then, that determination of this issue will have to await further research. It also raises the question that the inconsistency of support for this issue suggests that Vogel (1974) may have been correct in concluding that REM deprivation does not result in an increase in dysfunction. Perhaps the paucity of research suggests that others have come to this conclusion as well.

A more recent development than deprivation theory concerns the psychological reaction of schizophrenics once REM deprivation has been discontinued. In normal individuals, cessation of REM deprivation will be followed by several nights in which REM sleep is significantly increased, as if the denied dream time is being restituted. This is called a REM rebound effect, and represents a measurable, significant increase of REM activity over the individual's established baseline (pre-deprivation) of REM sleep to total sleep ratio. Dream state intrusion theory (particularly the RPEIH) suggests two possible effects in regard to schizophrenic rebound time, the most important of which is that schizophrenics will have significantly less rebound time than normals. It is theorized that this is because their REM needs are being compensated for by their schizophrenic symptomatology. A second possible effect, however, is that as schizophrenic symptomatology abates (through treatment or time passage) the schizophrenic will evidence significantly more REM time (rebound or baseline)

than the normal. This second effect reflects the assumption that schizophrenics will experience REM deprivation by the abolishment of their symptoms and hence will need to compensate for this by having more REM sleep time (i.e. a higher REM sleep to total sleep ratio).

Zarcone, Pivik, Gulevich, and Azumi (1968) ran a series of studies researching the effects of REM deprivation on 9 schizophrenic patients with active symptomatology, an unspecified number of schizophrenic patients with inactive symptomatology, 10 normal subjects, and 4 character disorder patients. The methodology consisted of establishing a baseline REM time for each subject over from 3 to 11 days, followed by 2 consecutive nights of REM deprivation. REM deprivation was accomplished by awakening the subject at the start of each REM period; by this method REM sleep was reduced by approximately 75%. Following 2 nights of deprivation, each subject was given a 5-night recovery period to sleep ad lib; subjects were monitored to measure the amount of REM compensatory time (REM rebound effect). Zarcone et al. (1968) found that schizophrenics with inactive symptomatology had significantly higher rebound effects than did the other subject group. Schizophrenics with active symptomatology had no rebound effects, a result which the authors described as "a highly unusual phenomenon" (p. 181). Interestingly, during the course of the studies some schizophrenics were REM deprived while symptomatically active and later when symptomatically inactive. Zarcone

et al. (1968) found that the same pattern held within subjects: when their symptoms were active, they had no rebound effects, and when their symptoms were inactive, they had an exaggerated rebound effect. For both schizophrenic groups, baseline REM time was normal. Zarcone et al. (1968) concluded that schizophrenics with active symptomatology do not build up a REM deficit even when REM deprived; it was postulated that this is because these individuals are able to get their REM met through their symptomatology. This logic appears to be supported by the exaggerated rebound effects in schizophrenics with inactive symptoms.

In a related and well-controlled study, Gillin et al. (1974) studied REM deprivation in 8 schizophrenics with active symptomatology and 8 nonpsychotic patients. Each subject was studied for 9 to 11 consecutive nights: 2 to 4 nights baseline, 2 nights of REM deprivation, and 5 nights of REM recovery/rebound. Measures were taken of REM time and REM percent of total sleep. REM deprivation was accomplished by awakening the subjects and keeping them awake for 4 minutes. Gillin et al. (1974) found that the schizophrenic subjects had no rebound effect, differing significantly from the nonpsychotic subjects who had considerable rebound effects following deprivation. No significant differences were found in baseline REM patterns. Both groups became less depressed and anxious after deprivation, but not significantly so.

In another study looking at rebound effects, Zarcone, Azumi, Dement, Gulevich, Kraemer, and Pivik (1975) compared the effects of REM sleep deprivation of 9 schizophrenic patients and 7 nonschizophrenic patients. Seven of the schizophrenic subjects were on phenothiazines during the course of the study. After a REM time baseline was established, each subject was REM deprived for 2 consecutive nights by being awakened and kept awake for 4 minutes at the onset of each REM period. A 5-night recovery period followed the 2 deprivation nights for each subject. The authors found that the schizophrenics had no REM rebound and thereby differed significantly from the nonpsychotic subjects who had sizable REM rebounds. This difference was particularly notable in light of the fact that the two groups did not differ significantly in total sleep time during the recovery period.

While Zarcone et al. (1968), Zarcone et al. (1975), and Gillin et al. (1974) are quite definitive, not all researchers have found results indicating that schizophrenics have differential rebound effects. For example, in a previously cited study, de Barros-Ferreira et al. (1973) lacked an adequate control group; their conclusion that there were no differential rebound effects is open to question.

In the previously cited longetudinal study by Snyder et al. (1968), sleep recordings from 4 depressive and 3 acute schizophrenic patients were taken over a period

spanning from 36 to 100 nights. Comparing the 2 groups, the authors found that, following REM deprivation, the schizophrenics did not experience rebound during the recovery period, whereas the depressives did. However, the authors stated that these results did not form a consistent pattern, and they therefore concluded that "naturally occurring REM deprivation and compensation do not appear to be strikingly evidenced . . . in acute schizophrenics" (p. 235). It is unclear what the authors meant by this conclusion, since their results indicated that schizophrenics had significantly less rebound than did the depressives. The small sample size makes the generalizability of these results questionable.

In a previously cited study with 5 schizophrenics, Vogel and Traub (1968) found that the mean REM percent for the subjects on the first postdeprivation night was significantly higher than the mean REM percent for the baseline nights. The authors concluded that schizophrenics exhibit rebound effects comparable to normals. As previously noted, Vogel and Traub (1968) used amphetamines to facilitate REM deprivation and did not have a control group. It is unclear what effect the amphetamines may have had on rebound effects in this study.

Although the weight of the research evidence seems to support the theory that schizophrenics have differential rebound effects, this support is weakened by the fact that 2 of the 4 supporting studies were headed by the same

researcher (Zarcone). In addition, the results of the contending studies cannot be readily discounted. More replication by well-controlled studies from various settings are needed to confirm that schizophrenic rebound is different from normal rebound.

Studies on the Dream Content of Schizophrenics

Various studies have looked at the type of content in schizophrenic dreams. The weight of the studies has attempted to determine whether or not schizophrenic dream content is different from the dream content of normals, and whether such content differences are diagnostically reliable. In one such study, Kramer, Baldridge, Whitman, Ornstein, and Smith (1968) compiled dreams from 40 paranoid schizophrenics, 40 psychotically depressed, and 40 non-psychiatric medical patients. The manifest dream content of each group was compiled and analyzed by the authors. Kramer et al. (1968) found that the manifest dream content for each group was significantly different from the other groups, and particularly that the schizophrenics' dream content was significantly different from the other groups. Unlike the other groups, the schizophrenic group dream content consisted primarily of the dreamer finding himself with a stranger in an implausible situation in which he is the victim of hostility. Notably, throughout the study the authors were aware of which diagnostic group each dream

belonged to, hence the results could have been affected by experimenter bias. Further, the groups were residing in different locales within the hospital; thus, location and hospitalization circumstances could have affected dream content.

In a much better controlled study, Brenneis (1971a) compiled and analyzed the manifest dream content of 25 schizophrenic males and 25 nonschizophrenic males. Both subject groups were inpatients at a psychiatric hospital, and their dream content was collected by their respective therapists. The author was blind as to the diagnosis of the dreamer until after the data analysis was completed. The data were analyzed using Rapaport's indices of thought disorder, a system of scoring the Rorschach applied to dream content. Subject dream content was scored for distortions of body boundaries and object representations, boundary polarizations and failure to maintain boundaries, the dreamer's relation to the dream, thought disorder, and nature of the dream introduction (how the dream was reported). Brenneis found that schizophrenics were the central figure of the dream significantly less often, exhibited significantly more thought disorder, and introduced their dreams with significantly fewer "I-statements," than did the nonschizophrenic group. The author concluded that schizophrenic content was significantly distinguishable from nonpsychotic content,

and hence dream content may be useful in making diagnostic distinctions.

In another study, Langs (1966) compared the manifest dream content of 3 clinical groups. The subject groups consisted of, respectively, 12 hysterics, 12 paranoid schizophrenics, and 12 psychotic depressives. Dreams were elicited from the subjects at the time of their admission interviews, and "specific request was made for dreams of the previous night, of the period just prior to admission, of childhood, of a repetitive nature, and of any type remembered" (Langs, 1966, p. 635). Manifest content of the dreams was scored by two scorers who were blind as to subject diagnosis. Dream content was scored on the basis of the frequency of certain content items in the dreams. The key content items included the types and roles of persons, affect, setting and movement, body references, general themes (such as conflict, illness), aggressiveness, socialness, how the dream was experienced (good, bad, or innocuous), the logic of the dream, and the likelihood that the dream could be reality based. Langs (1966) found that the three clinical groups were significantly differentiated from one another by their manifest dream scores, and hence the schizophrenic group had significantly differential dream content. Relative to the other groups, the schizophrenics' manifest dream content had significantly fewer family members, more conflict and damage themes ". . . of which the patient was most often the recipient" (Langs, 1966, p. 638),

more instances where the subject's role was that ". . . of the recipient of harm or trauma" (p. 638), and fewest instances in which the subject or others received care or help. Further, Langs (1966) found that, for schizophrenics, the environment was judged friendly significantly less often and significantly most often judged as overwhelming and hopeless. Also significantly different were the tendency for the dream setting to change, the frequency with which the subject moved, the tendency for the action of the dream to center in the patient rather than others, the complete absence of dreams which were similar to daily occurrences and reality, and the preponderance of traumatic dreams. Langs (1966) concluded that the manifest content of the dreams of paranoid schizophrenics is significantly differential from the dreams of the other two diagnostic groups, and that the dream content of the schizophrenics was consistent with the nature of their psychological disturbance.

In another study, Kramer and Roth (1973) compared the content of REM-dream reports of depressed and schizophrenic patients. Subjects consisted of 5 male and 5 female depressed patients, and 11 male and 2 female schizophrenic patients. Dream reports were collected with a standardized interview schedule 5 minutes after the onset of each REM period during the night, and the dream reports were scored using the Hall-Van de Castle dream content scoring system. The schizophrenics reported significantly more strangers, a

significantly higher male to female character ratio, significantly more aggressive social interactions, and significantly more apprehensive emotions, as compared to the depressed population. The authors concluded that the dream contents could be differentiated between groups at a significant level and that this suggested subjective differences in thought life. Notably, the disparity in subject sex ratios could have confounded the dream content sex ratios.

Other studies have contested the discriminability of schizophrenic dream content. Hall (1966) studied dream content in 50 patients split into 4 groups: schizophrenic and alcoholic, schizophrenic and nonalcoholic, nonschizophrenic and alcoholic, and neither schizophrenic nor alcoholic. Forty-six dream content variables were scored using the Hall-Van de Castle scoring system and the data was analyzed by the author without knowledge of each subject's diagnosis. Hall found no significant differences by which to diagnostically differentiate the groups from each other, other than that the length of the schizophrenics dream reports was significantly shorter than that of nonschizophrenics.

In a somewhat different study, Brenneis (1971b) also challenged the discriminability of schizophrenic dream content. Brenneis collected 2 to 5 manifest dreams from 50 male psychiatric inpatients, 25 schizophrenic and 25 nonschizophrenic; the author offers no description of the

collection process. Eight groups of judges representing varying experience and professional levels with psychotic patients, ranging from psychologist to nonprofessional, were each asked to diagnose each patient as schizophrenic or nonschizophrenic on the basis of manifest dream samples. In addition, they were to list the five subjects which they felt most certain were schizophrenics and the five subjects which they felt most certain were nonschizophrenic; for the schizophrenic selections, the judges were to indicate the specific elements in the dream on which they based their diagnostic decision. Independently, the dreams were scored for the presence of representations of loss of body integrity and evidence of thought disorder. The authors found that none of the judges groups performed above chance levels in distinguishing schizophrenic dreams from nonschizophrenic dreams, and only the psychologist group showed any degree of accuracy.

The weight of the research on dream content differences between schizophrenics and other groups supports the hypothesis that schizophrenic dream content can be diagnostically differentiated from both normals and other clinical groups. However, support for this hypothesis rests on 4 studies. Further, 2 other studies denied confirmation to the hypothesis, and the resolution to this conflict is not readily apparent. Given this contradiction and paucity of research in this area, confirmation of the diagnostic

differentiality of schizophrenic dream content will have to await further research.

Other research efforts have focused on assessing what kind of content patterns are evident in the dreams of schizophrenics. Theoretically, schizophrenic dream content should have recurring themes and should reflect the underlying psychopathology of the schizophrenic. Germane to the RPEIH, schizophrenic dream content theoretically should resemble the manifestations of schizophrenic waking thought and behavior; if this is true, then it can be argued that this is consistent with a theory of dream state intrusion on the waking state of schizophrenics.

Investigating schizophrenic dream themes, Kramer et al. (1970) studied 11 male paranoid schizophrenics before and after psychotropic medication treatment. Before treatment, each subject was monitored for 3 nights and was awakened 5 minutes after entering each REM period to make a dream report. After 2 to 4 weeks of treatment and adequate improvement as measured by a behavioral rating scale (pre- and post-treatment measures), this process was repeated. Manifest dream content was compiled and analyzed using the Hall-Van de Castle scoring system. The authors found that the schizophrenics' dreams were characterized by high levels of hostility, aggression, and actions by strangers; treatment markedly reduced these characteristics as indicated by both the behavioral scales and dream content. Unfortunately, the authors offer no indications of

significance and no comparison groups. More importantly, the effects of treatment in changing dream content characteristics are suspect; these changes could reflect the effects of clinical improvement on the schizophrenics dream reports, not necessarily the dream contents.

Other studies, some better controlled and with comparison groups, have also found specific themes in the dreams of schizophrenics. Brenneis (1971a) found that the manifest content of schizophrenic dreams contained significantly more primary process material (fabulized combination, confabulation, and contamination) than did the dreams of normals, and that the schizophrenics exhibited significantly greater difficulty reporting their dreams around a sense of self; that is, the self is minimized and other figures are dominant. Specifically, schizophrenics were the central figure of the dream significantly less often, exhibited significantly more thought disorder, and introduced their dreams with significantly fewer "I-statements," as compared to a nonschizophrenic group. Surprisingly Brenneis found no difference between schizophrenics and normals in amount of distortion of body boundaries or boundary polarizations in dream content.

In a previously cited study, Langs (1966) studied the manifest dream content of 12 paranoid schizophrenics, 12 hysterics, and 12 psychotic depressives, all female inpatients. Langs (1966) found that the manifest dream content scores of the schizophrenics were significantly

different from the other clinical groups, and found that their manifest dream content was consistent with their psychopathology. The author summarized the manifest content of the schizophrenics as ". . . reflecting a proneness to conflict with others, and a view of the environment and others as predominantly traumatizing and overwhelming. The paranoids' dreams center around the patient herself and are furthest from daily reality" (Langs, 1966, p. 638).

Kramer and Roth (1973) found that, in comparison to depressed patients, the dream content of schizophrenic patients had significantly more males than females and significantly more strangers in them. There were 11 male and 2 female schizophrenic subjects as compared to 5 male and 5 female depressed subjects; the authors contend that their results are not affected by these sex differences but offer no rationale or data to support their contention. Further, the schizophrenic content showed significantly more aggressive social interactions, and significantly more "apprehensive emotions" (p. 328) than did the depressed patients' content (Kramer & Roth, 1973). Similarly, Hall (1966) found that schizophrenic dreams had significantly fewer friendly interactions with females than did nonschizophrenics. Kramer et al. (1968) found similar characteristic content in the dreams of paranoid schizophrenics, summarizing that "the paranoid schizophrenic finds himself with a stranger in an implausible situation in which he is the victim of hostility" (p. 221).

In a study related to dream content because it looked at fantasy bizarreness levels, Cartwright (1972) compared the fantasy levels in schizophrenic and nonschizophrenic populations. The 3 subject groups consisted of, respectively, 8 schizophrenics, 10 college students with MMPI scale Sc+K scores of 70 or higher, and 14 college students with MMPI scale Sc+K scores of below 70. After taking the MMPI, subjects were sleep monitored for two nights and dream reports collected from 2 REM periods and 2 NREM periods. During the course of the study, the schizophrenics received no medications (as per hospital policy for new admissions), and subjects were matched for sex and age between groups. The author predicted that ". . . as disturbance level increases, the discrimination between thought styles associated with the different physiological states [REM and NREM] is reduced" (Cartwright, 1972, p. 278). The fantasy levels of the REM and NREM periods' dreams were scored by two raters using the Foulkes Dream-like Fantasy Scale; the raters were blind as to the subject's experimental/diagnostic group until after the data were analyzed. The author found that the 3 subject groups differed significantly in the "fantasy level of the reports of REM awakenings with the normal/low Sc+K group scoring highest or most bizarre" (p. 278). The author found that the difference between the mean REM and NREM fantasy scores was not significant for the schizophrenic group, but was significant for both the high Sc+K normal group and the low

Sc+K normal group (with significance levels of .05 and .01, respectively). The author concluded that the hypothesis was supported. Notably, these results suggest some leakage or intrusion of the dream-state (REM) into a non-dream state (NREM), offering some support for the RPEIH. However, the validity of this study is weakened by its lack of standard methodology across groups; the schizophrenics were tested in a different locale than were the normals, and they were not awakened following two REM and two NREM periods as were normals but were instead allowed to sleep until they spontaneously awoke. Further, 3 of the 8 schizophrenic subjects were later diagnosed as character disorder, and their Sc+K scores were below 70. The data from these subjects was not excluded from the schizophrenic means.

In a previously mentioned study which also looked at dream content, Brenneis (1971a) draws conclusions which cogently summarize the apparent results of the preceding studies. He notes that there appears to be "a striking continuity between the thinking of schizophrenics during wakefulness and sleep" (Brenneis, 1971a, p. 87). It is not clear, however, how much the schizophrenics' thought process contaminated their dream reports and hence affected the outcomes of these studies. It seems quite possible that a schizophrenic with active symptoms could report a dream through the filter of thought disturbance and hence effect its reported content. None of the studies directly address this issue, surprising since it could constitute a serious

confounding variable in terms of comparing dream process to waking thought process. It, of course, would not be an issue in terms of diagnostic differentiation, because reporting variables in this regard are useful contributors to diagnostic differentiation.

In regard to the research on specific themes in the dreams of schizophrenics, the literature is too sparse to be conclusive but it does suggest certain trends. In particular, the reviewed literature suggests schizophrenic dreams do have recurrent themes, notably that of the dreamer being afraid, alienated, and victimized. These themes are congruent with the waking thought-life of schizophrenics, though again comparisons must be cautious in light of possible confound from reporting effects.

Studies on Physiological Abnormalities During REM

Several studies have focused on researching the extent of physiological abnormality in schizophrenics during REM sleep. Theoretically, if the dream state is dysfunctional in schizophrenics or at least mechanistically related to schizophrenic symptomatology, then schizophrenics should evidence some abnormalities in REM function and its physiological correlates. In particular, significant leakage of physiological behavior normally limited to REM sleep into non-REM sleep or waking would lend support to an intrusion hypothesis. Also, abnormalities in REM time, such

as length of REM or REM percent of total sleep, would suggest that the boundaries of REM behavior have been compromised and REM behavior is being manifested under other conditions (such as psychosis). Of course, should any of these physiological manifestations of REM sleep prove consistently abnormal and measurably so, then this would constitute an immensely significant diagnostic tool for differentiating schizophrenics from other populations; such a physiological indication may also prove to have treatment implications. Several studies have attempted to address these issues from diverse angles.

Benson and Zarcone (1982) compared schizophrenics to three other diagnostic groups to see if there would be any between group differences in middle ear muscle activity (MEMA) during REM sleep; MEMA is a physiological correlate of REM sleep and hence dream activity. There were 4 subject groups in the study: 11 schizophrenics, 8 schizoaffective disordered, 10 major depressive disordered, and 13 normal controls. All subjects were military veterans and all mental disordered group subjects were patients at a psychiatric hospital. REM measurements and MEMA recordings were taken over 4 consecutive nights, with the first 2 nights representing adaptational nights; that is, actual data was collected only on nights 3 and 4. The authors found that there were significant differences in MEMA during REM sleep between diagnostic groups, and particularly that schizophrenics had significantly greater MEMA during REM

sleep than did schizoaffective disordered patients. Schizophrenics also had greater MEMA than the other diagnostic groups, but not significantly.

In a related study, Benson and Zarcone (1985) again studied MEMA as well as the activity of extraocular muscles called periorbital integrated potentials (PIPs). Theorizing that these are physiological correlates of dream activity (REM sleep), the authors sought to determine if these physiological correlates would shift or leak to sleep stages other than REM at differential levels in schizophrenics; if so, this would lend support to the RPEIH. The subjects, all military veterans, consisted of 13 normals, 11 schizophrenics, 8 schizoaffective disordered, and 10 major depressive disordered. The mental disordered groups were inpatients in a psychiatric hospital. Notably, this subject pool is identical to that used in the previously cited study. As in the previous study, sleep recordings were made for MEMA over four nights with data actually collected only on nights 3 and 4. After 5 nights, sleep recordings were made for PIPs over 4 nights, with data collected only on the latter 2 nights. This procedure was not standard, however; it applied only to the normal subjects. The patient subjects were tested over 6 straight days; that is, they received no 5-day latency period and thus did not need to readapt to the lab conditions. This was deemed necessary to minimize the length of time the patients would have to go without medication (they received no medication during the

study). The authors found that the schizophrenic group had a significantly higher within-REM MEMA rate than did the schizoaffective group, and was higher than other groups but not significantly. None of the patient groups showed a significant redistribution of PIP or MEMA activity into pre-REM or post-REM sleep stages, therefore the RPEIH was not supported.

Other researchers have looked at differential REM effects and other diagnostic groups. In a well-controlled study, Stern, Fram, Wyatt, Grinspoon, and Tursky (1969) researched REM differences between 8 actively ill, unmedicated schizophrenics and 6 normal control subjects. All-night sleep recordings were made of each subject, 5 to 10 nights for the schizophrenics and 5 nights for the normals. The authors found that while schizophrenics did not differ significantly in REM total time or REM percent of total sleep, they did have significantly shorter REM latency periods than did the normals, meaning that they started dreaming earlier into the sleep cycle. The authors hypothesized that this shorter REM latency time resulted from a need to make up for REM deprivation which had occurred at the time of psychotic onset. However, since the schizophrenics were actively ill, such a need to restitute lost REM would seem inconsistent to the RPEIH.

Jus, Bouchard, Jus, Villeneuve, and Lachance (1973) studied REM sleep differences in an aged, never biologically treated population of long-term schizophrenics. The

subjects consisted of 11 male schizophrenics, ages 62 to 85, and 10 age-matched normal controls, ages 66 to 82. All subjects were sleep recorded for 2 nights, with data collected only on the second night (the first night was for adaptation purposes). Jus et al. (1973) found that the old schizophrenics differed significantly from the controls in mean number of REM periods, mean duration of each REM period, and mean REM latency. Specifically, the schizophrenics had more REM periods, shorter REM periods, and shorter REM latency periods. In addition, the schizophrenics awakened during REM sleep significantly more often than did the controls. However, there was no significant difference in mean REM percentage. The authors hypothesized that schizophrenics may have "increased REM-period vulnerability" (p. 390) on the basis of their REM disturbance, but did not explain this further. Presumably, the authors were suggesting that the REM boundaries of schizophrenics are more permeable than those of normals, and that therefore leakage of REM behavior into non-REM states is feasible.

In a related study, Wyatt, Stern, Fram, Tursky, and Grinspoon (1970) researched spontaneous skin potential fluctuations (SPF) during the REM sleep of 8 acute schizophrenics inpatients (unmedicated) and 6 normal controls. It was hypothesized that if physiological activity normally present while awake and not present during REM was differentially present in schizophrenics, then this

would show that REM sleep and waking are not as physiologically distinct in schizophrenics as they are in normals. Sleep records were made for the schizophrenics for 3 to 10 nights, and for the normals for 5 nights. The authors noted that, for the schizophrenics, "several nights of SPF data had to be discarded because recordings were inadequate for scoring" (p. 302). The authors found that the schizophrenics had significantly reduced REM activity compared to the controls, and that the SPF of schizophrenics was significantly higher than for controls. Further, the authors found that, for the schizophrenics, the SPF means for REM sleep and waking were nearly identical (1.59 and 1.51, respectively). The authors concluded that these results supported the hypothesis and suggest that REM and waking boundaries are less distinct for schizophrenics than for normals; similarly, the decreased REM may suggest that "the factors causing REM might be active during waking" (p. 306).

Gulevich, Dement, and Zarcone (1967) researched the differences in REM sleep patterns between a control group and schizophrenics. The subjects consisted of 13 hospitalized chronic male schizophrenics in "a state of remission," and 7 nonpsychotic males (control group). All patients were withdrawn from medication at least 4 days prior to the study and none of the control subjects were on medications. Continuous polygraph recordings were made on each subject for 3 to 5 consecutive nights. The

schizophrenic group showed ". . . significant elevations in both mean percentage of REM sleep and absolute amount of REM sleep although both groups had a nearly identical mean total sleep time" (Gulevich et al., 1967, p. 142). The schizophrenic group also exhibited a significantly shorter mean REM latency time (time from onset of sleep to onset of first REM period). The authors concluded that chronic schizophrenics in remission display significantly elevated nightly REM time as compared to nonpsychotic controls.

The findings from the previously cited studies have not gone unchallenged, however. The results of other studies dispute that schizophrenic REM sleep is significantly different from that of normals. For example, Caldwell and Domino (1967) compared the REM patterns of 25 hospitalized male schizophrenic inpatients (unmedicated) with 10 medical student controls. All-night recordings were made of each subject for 5 consecutive nights, and data was collected from the second night. The authors found no significant differences in either mean percentage of REM sleep time or length of REM periods between the schizophrenics and the controls.

Itil, Hsu, Klingenberg, Saletu, and Gannon (1972) compared the REM sleep of 31 chronic schizophrenics (18 males and 13 females, unmedicated) to 13 nonpsychotic subjects (11 normals and 2 subjects with myasthenia). After one night of adaptation, data was collected from the second night of recorded sleep. The authors found no significant

differences between the 2 groups regarding the length of REM sleep, the amount of REM sleep, and the nature of the REM cycles.

In a similar study, Gaillard, Iorio, Campajola, and Kemali (1984) compared the REM sleep patterns of 8 schizophrenic inpatients (4 males and 4 females) with 5 obsessive-compulsive disordered inpatients. All patients had been medication free for at least 10 days. All subjects were recorded for 2 consecutive nights after one night of adaptation. The data from the schizophrenics and the obsessive-compulsive patients were compared to each other and to control groups of 16 normals and 15 normals, respectively. The authors found that the total REM sleep time and the percentage of REM sleep of the schizophrenics was significantly lower than for the other subject groups; however, the "general trend of [REM sleep] was not different between schizophrenics and controls" (Gaillard et al, 1984; p. 78). Based on these findings, the authors concluded that the significant REM sleep time differences were due to the shorter sleep time of the schizophrenics and that therefore the schizophrenics did not significantly differ from any of the groups. This conclusion appears unwarranted, given that most researchers agree that REM percent is not variable as a function of total sleep time.

Because of the diversity of the research, the results of studies on physiological abnormalities in schizophrenic REM sleep are difficult to summarize. The reviewed

literature is nearly evenly divided regarding whether or not schizophrenics differ significantly from normals in REM mean time, REM percentage, or the nature of REM cycles. This conflict appears presently irresolvable and must await further research. There is some support to suggest that schizophrenics have shorter REM latency, but this needs more replication. Two studies suggest that MEMA offer a means to differentially diagnose schizoaffective and schizophrenic disorders. However, both studies are by the same authors using the same subject pool, hence replication by others is needed before these results can be taken more seriously. Lastly, there is some inferential support for the hypothesis that the boundaries of REM sleep are weaker for schizophrenics than for normals. However, the evidence for this case is weak and will need replication and generalization. All of this adds up to minimal support for the RPEIH.

Summary and Conclusions

This paper has attempted to organize and review the research on dreaming in schizophrenics amassed over the past 20 years. An attempt has been made to discern what, if anything, has been determined and what direction future efforts can take. The literature was organized and reviewed around three major issues: (a) the effects of REM deprivation, (b) the nature of schizophrenic dream content,

and (c) the extent of physiological abnormalities during REM sleep evidenced by schizophrenics. Though few questions were answered, some conclusions can be drawn regarding each of the three major issues and the tenability of intrusion theory (the RPEIH).

The recent research on the effects of REM deprivation on schizophrenics has been scarce, and what has been done is generally methodologically weak. Given the unstable nature of schizophrenics and the behavioral overtness of their florid symptoms, it would seem that the disruptive effects of REM deprivation would be readily apparent behaviorally if extant at all. While this has not consistently occurred, the weight of the better studies over the past 20 years and prior suggest that schizophrenics do experience a significant disruptive effect from REM deprivation in that their pathology is significantly aggravated. There is more convincing (though again, not uncontested) support to suggest that schizophrenics do experience rebound effects significantly different from normals. Both of these preliminary conclusions offer tentative support for the RPEIH and seem to warrant further research in the area.

The recent research on dream content, though the most subjective avenue of investigation, appears promising. The weight of the research suggests that schizophrenic dream content can be diagnostically differentiated from normals and some other clinical groups. Further, there is fairly consistent evidence that schizophrenic dream content is

characterized by recurrent themes of being afraid, victimized, and alienated--themes which are congruent with the underlying psychopathology of schizophrenics. These conclusions are supportive of the RPEIH. However, the conclusions regarding the themes of schizophrenic content are subject to compromise by reporting effects. It is unclear to what extent dream content is altered when reported by a schizophrenic with active symptoms; any alterations could confound comparison of schizophrenic waking thought with dream themes. Research is needed to assess the impact, if any, of reporting effects on the thematic content of dreams from schizophrenics and other clinical groups. A related issue, also unaddressed by the research, is the effects of dream content decay. It would seem that dream content could vary as a function of report latency; that is, how soon a dream is reported after it is dreamt could effect its reported content, particularly for individuals with thought disorder. Research is needed to assess the affects of differential report latency on reported dream content; it would seem that dream reports would be most accurate when accessed directly following the REM state.

The research on physiological abnormalities during REM, though the most objective, is also the most diverse and hence the most difficult from which to draw conclusions. The paucity of effort in any one direction renders any specific conclusions premature, but preliminary general

conclusions may be forwarded. The research suggests that schizophrenics do evidence some significant physiological deviations during the REM state which merit further investigation; specifically, schizophrenics have manifested significant deviations in middle ear muscle activity, in skin potential fluctuations, and in REM time characteristics. Some of these deviations provide weak inferential support for the hypothesis that the boundaries of REM sleep are weaker for schizophrenics than for normals. These preliminary findings offer some tentative support for the RPEIH.

While all of the preceding conclusions suggest continued research may hold heuristic promise, it is less clear that further efforts would be warranted by the potential clinical gains. Conclusive findings in any of the areas of investigation, or clear, uncontested support for the RPEIH would substantially further etiology and treatment theory and offer diagnostic tools. However, in its present state of development, much of the dream assessment methodology is of questionable clinical practicality. Due to equipment costs, staffing limitations, and consideration of patient needs and rights, it appears impractical to implement diagnostic procedures based on REM deprivation/rebound methodology, or based on physiological monitoring technology. The assessment of dream content, which requires the most clinical judgment of the three areas of investigation, appears to be the only area which lends

itself to practical application; and as previously noted, reporting effects will have to be determined before the clinical feasibility of diagnostic dream content assessment is clear. Even if contaminated by reporting effects, it may be determined that diagnostic dream content assessment offers a useful projective device in that it provides the patient with a relatively safe medium to express psychological disturbance under the guise of a dream. Given all of these considerations, it appears that clinical practicality should be a factor in determining the cost/benefit of future research in the areas of investigation.

Apart from the clinical considerations, there does appear to be sufficient support for differential REM sleep activity/disturbance in schizophrenics to warrant further research. None of the hypotheses under study have been disproved or shown to be without support by the research literature. Hence, the RPEIH has not been disproven but it is yet to be consistently supported. However, the inconsistency of the empirical support for differential REM sleep phenomena in schizophrenics raises some concern as to the tenability of the theory. It would seem that if differences exist, particularly in terms of dream-state intrusion on the waking state, the research efforts of over 20 years would offer more definite answers. The empirical inconsistencies may reflect a basic invalidity in the theory; perhaps REM variations in schizophrenics are simply

another artifact of the illness that varies individually. Indeed, despite the general intuitive belief that psychosis and dreaming are linked, no consistent patterns have been replicated without significant challenge.

Still, the preliminary findings suggest that the field is promising, and the potential gains are too great to abandon on the basis of doubt. Further research is needed to explore all of the issues discussed, particularly in terms of the interaction of schizophrenic symptom levels and REM activity. The research needs to be better controlled for individual and experimenter variables, and agreement between researchers as to a systematic focus would be helpful. A particular need is a standardization of research procedures so that findings are more comparable and generalizable. All of the studies vary considerably in such areas as schizophrenic subclass diagnoses, REM deprivation procedures, length of measurement periods, and scoring procedures for deprivation effects or dream content. In terms of dream content analysis, the reporting issue will have to be resolved before any serious conclusions can be drawn from findings in this area.

In concluding, it appears that few questions to date have been fully answered, and most of the issues in tension 20 years ago are no more resolved now. Still, research techniques and theory have been generated and refined, and areas of promise remain open for investigation.

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